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(19) (CA) **CANADIAN PATENT** (12)

(54) Shear Coupling Assembly

(72) Mann, Jay S. , Canada
Wolodko, Benny B. , Canada

(73) Corod Industries Inc. , Canada

(57) 2 Claims

1 "SHEAR COUPLING ASSEMBLY"

2 ABSTRACT OF THE DISCLOSURE

3 A shear coupling assembly is provided for
4 connecting the rod of a downhole pump with the terminal
5 member of a sucker rod string. The assembly involves two
6 parts or coupling members which are threadably connected end
7 to end during normal operations but which can relatively
8 easily be parted if the pump becomes stuck, by pulling up on
9 the still free sucker rod string. The first coupling member
10 has a pin end incorporating an externally threaded head and a
11 shear neck, of relatively reduced diameter, joining the head
12 to the main body of the coupling member. The head has an
13 axial, internally threaded counterbore, so that a tensioning
14 tool may be screwed thereinto, the other end of the coupling
15 member may be held, and the tool may be pulled to place the
16 shear neck in tension. The second coupling member is a sleeve
17 forming an axial bore therethrough. The second coupling
18 member is adapted to thread onto the head of the first
19 coupling member. To prepare the assembly for use, the
20 tensioning tool is inserted, the sleeve is slipped over the
21 tool, the tool is pulled to place the neck in tension, and
22 the sleeve is threaded along the head until it abuts the main
23 body of the first coupling member. The tensioning tool is
24 then removed. The sleeve functions to hold the shear neck in
25 a tensioned state. The tensioned neck is better able to
26 sustain cyclic compressive loading in the course of
27 reciprocation of the sucker rod string.

1 Field of the Invention

2 The present invention relates to a shear coupling
3 assembly for interconnecting the rod of a downhole pump with
4 the terminal member of the rod string which actuates the
5 pump. The assembly is adapted to preferentially part when
6 the pump is stuck and the rod string is pulled.

7 BACKGROUND OF THE INVENTION

8 In a pumped well, a reciprocating rod string is
9 used to actuate a downhole pump. The rod string is made up
10 of a multiplicity of sucker rods connected end-to-end by
11 means of threaded couplings. Typically, a sucker rod might
12 have a length of 30 feet, a stem diameter of 5/8", an
13 externally threaded 7/8" pin coupling at one end and an
14 internally threaded 7/8" box coupling at the other end.
15 Alternatively, a single continuous rod may be used to extend
16 from the pump jack down to the pump. Hereafter the term "rod
17 string" is used generically to denote the two types of pump-
18 actuating rods.

19 There are occasions when the pump will become
20 lodged or stuck in the well, either at its downhole operating
21 position or when being tripped out of the well. For example,
22 sand contained in the produced fluid may settle on top of the
23 pump and prevent its upward removal.

24 It is then desirable to be able to separate the rod
25 string from the pump, in order to remove it so that
26 specialized equipment may be introduced into the tubing to
27 free the pump.



1 In most wells, the operators do not provide for a
2 parting means in the string at the juncture of the rods and
3 the pump. If the pump is stuck, the rod string is simply
4 pulled until parting occurs. This break can occur anywhere
5 in the rod string, which can be a problem.

6 Heretofore, there have been shear assemblies used
7 at the junction of the pump and the rod string. The version
8 which we have seen in use involves joining male and female
9 coupling members with transversely extending shear pins. The
10 shear pins are designed to part before the stem of a sucker
11 rod. However, there are two problems associated with this
12 assembly. Firstly, the shear pins are prone to premature
13 fatigue. This fatigue arises from the cyclic compressive
14 stress which is induced in the shear pins if the rod string
15 "taps down" at the base of each downstroke. Secondly, when
16 the shear pins are broken, their splinters drop onto the
17 pump; this can lead to problems in freeing the pump.

18 There exists, therefore, a need for a rod string
19 shear coupling assembly which is better adapted to undergo
20 cyclic compressive loading without failure and which may be
21 pulled apart without producing splinter pieces that are free
22 to drop down the tubing annulus.

23 SUMMARY OF THE INVENTION

24 In accordance with the invention, a shear coupling
25 assembly is provided having a pin coupling member and a box
26 coupling member. The pin coupling member has a pin end
27 comprising an externally threaded head and a shear neck, of
28 relatively reduced diameter, joining the head to the main

1 body of the coupling member. The head is counterbored
2 longitudinally from its forward end and internally threaded.
3 The main body of the pin coupling member is provided with
4 means for threadably connecting the member to the sucker rod
5 string or, if inverted, to the pump. The main body further
6 provides a contact shoulder for a purpose explained shortly.
7 The box coupling member is an internally threaded sleeve into
8 which the head of the pin coupling member may be threaded.
9 The box coupling member also has means for threadably
10 connecting it to the rod string or pump, as appropriate.

11 In assembling the device, the body of the pin
12 coupling member is held, a threaded tensioning tool, such as
13 a bolt or the like, is screwed into the head, the box
14 coupling member is slipped over the bolt, and a pull is
15 applied to the bolt to tension the shear neck. The box
16 coupling member is then screwed along the head until it abuts
17 the pin coupling member by contacting the aforementioned
18 contact shoulder. The bolt is then released and removed.
19 The box coupling member functions to "lock in" the tension
20 stress induced in the shear neck by pulling on the bolt.
21 Stated otherwise, the shear neck remains in a tensioned
22 state.

23 Broadly stated, the invention is a shear coupling
24 assembly for connecting the rod of a downhole pump with the
25 terminal member of a rod string, comprising: a pin coupling
26 member having a pin end portion and a body end portion, said
27 pin end portion comprising an externally threaded head and a
28 shear neck joining the head to the body portion, said shear
29 neck being of sufficiently reduced diameter so that it will

1 preferentially part when the pump is stuck and the rod string
2 is increasingly tensioned, said body portion having means, at
3 its end remote from the head, for threadably connecting with
4 one of the rod string or pump rod, said head having means for
5 connecting with a tensioning tool; and a box coupling member
6 comprising an internally threaded sleeve threadably engaging
7 the head and having means for threadably connecting with the
8 other of the rod string or pump rod; said sleeve contacting
9 the body end portion of the pin coupling member; said shear
10 neck being in a tensioned state.

11 DESCRIPTION OF THE DRAWING

12 Figure 1 is a sectional side view of one embodiment
13 of the shear coupling assembly; and

14 Figure 2 is a partly sectional side view of an
15 alternative embodiment of the assembly.

16 DESCRIPTION OF THE PREFERRED EMBODIMENT

17 With reference to Figure 1, the shear coupling
18 assembly 1 comprises a pin coupling member 2 and a box
19 coupling member 3.

20 The pin coupling member 2 comprises a body portion
21 4, an externally threaded head 5 and a shear neck 6 joining
22 the head 5 with the body portion 4. The body portion 4 is of
23 greater width than the head 5 and forms a radial contact
24 shoulder 7. The shear neck 6 is of reduced diameter relative
25 to the head 5. Specifically the shear neck 6 is designed to
26 preferentially part before the rod string (not shown) or pump
27 rod (also not shown), when the pump is stuck and the rod

1 string is subjected to increasing tension. The head 5 forms
2 an internally threaded axial counterbore 8 which extends
3 inwardly from its forward end. At its end remote from the
4 head 5, the body portion 4 forms an internally threaded axial
5 bore 9, for connecting to one of the rod string or pump rod.

6 Turning now to the box coupling member 3, it
7 comprises a sleeve 11 forming an internally threaded axial
8 bore 12. One end of the sleeve 11 is dimensioned to
9 threadably engage the head 5 and advance thereover. The
10 other end of the sleeve 11 is adapted to thread onto the pin
11 end of the other of the rod string or pump rod.

12 To assemble the device, the body portion 4 of the
13 pin coupling member 2 is suitably held and a bolt (not
14 shown) is threaded into the head counterbore 8. The sleeve 11
15 is slipped over the bolt. The bolt is then tensioned by
16 pulling on it, to thereby place the shear neck 6 in tension.
17 The sleeve 11 is then advanced along the head 5 until it
18 abuts the contact shoulder 7. The bolt is then removed. The
19 sleeve 11 functions to lock the shear neck 6 in a tensioned
20 state.

21 The alternative embodiment shown in Figure 2 is
22 essentially the same as that shown in Figure 1. In this
23 case, the body portion 4 is provided with a threaded pin 10
24 for connection with the rod string or pump rod. Similarly, if
25 desired the end of the sleeve 11 may be formed to provide a
26 pin at its end remote from the head 5.

1 The invention is characterized by the following
2 advantages:

- 3 - there are no shear pin parts left free to drop
4 down the tubing annulus when parting occurs;
5 and
6 - the tensioned shear neck should remain in
7 tension even though the rod string may be
8 cyclically tapping down.

9 The scope of the invention is set forth in the
10 following claim.

1 THE EMBODIMENTS OF THE INVENTION IN WHICH AN
2 EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS
3 FOLLOWS:

4 1. A shear coupling assembly for connecting the
5 rod of a downhole pump with the terminal member of a rod
6 string, comprising:

7 a pin coupling member having a pin end portion and
8 a body end portion, said pin end portion comprising an
9 externally threaded head and a shear neck joining the head to
10 the body portion, said shear neck being of sufficiently
11 reduced diameter so that it will preferentially part when the
12 pump is stuck and the rod string is increasingly tensioned,
13 said body portion having means, at its end remote from the
14 head, for threadably connecting with one of the rod string or
15 pump rod, said head having means for connecting with a
16 tensioning tool; and

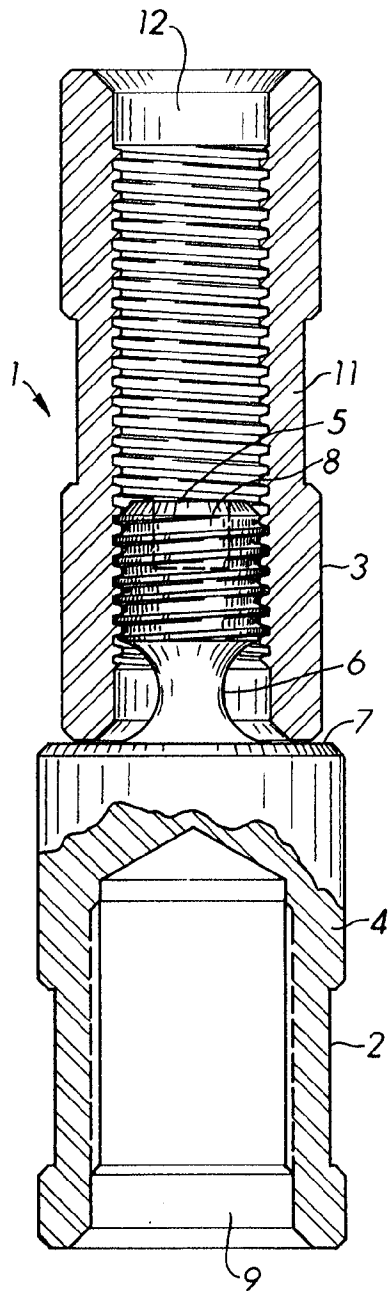
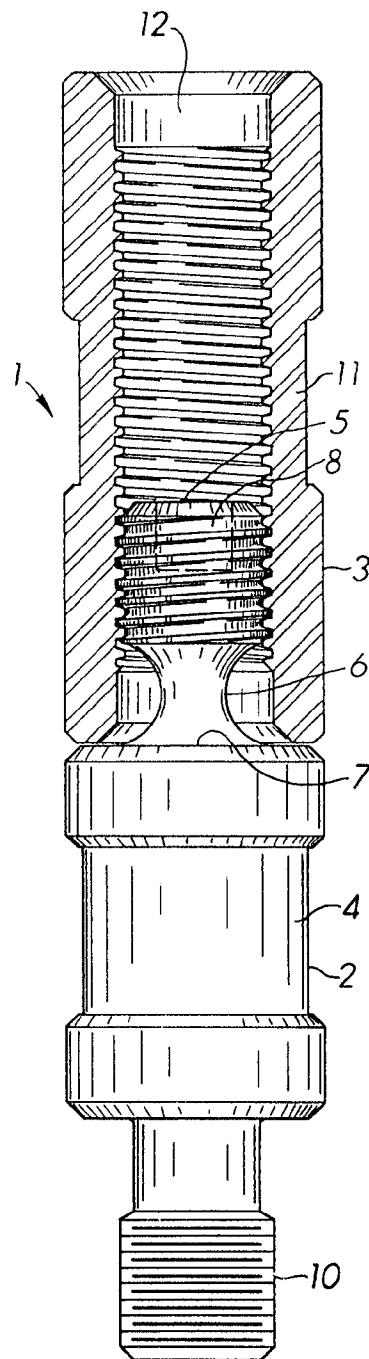
17 a box coupling member comprising an internally
18 threaded sleeve threadably engaging the head and having means
19 for threadably connecting with the other of the rod string or
20 pump;

21 said sleeve contacting the body end portion of the
22 pin coupling member;

23 said shear neck being in a tensioned state.

24 2. The assembly as set forth in claim 1 wherein:
25 the head forms an internally threaded counter bore
26 extending axially inwardly from its end to provide the means
27 for connecting with a tensioning tool.



Fig. 1.Fig. 2.

Patent agent:

E. P. Johnson